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10/578,088

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Shigenori Kuga

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EXAMINER

LAU, JONATHAN S

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/578,088	<b>Applicant(s)</b> KUGA ET AL.	
	<b>Examiner</b> Jonathan S. Lau	<b>Art Unit</b> 1623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is responsive to Applicant's Amendment and Remarks, filed 27 May 2008, in which claim 1 is amended to change the scope and breadth of the claim.

This application is the national stage entry of PCT/JP05/07349, filed 08 Apr 2005; and claims benefit of foreign priority document JAPAN 2004-132880, filed 28 Apr 2004; currently an English language translation of this foreign priority document has not been filed.

Claims 1-14 are pending in the current application. Claims 8-14, drawn to non-elected inventions, are withdrawn.

### ***Rejections Withdrawn***

Applicant's Amendment, filed 27 May 2008, with respect to claims 1-5 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter has been fully considered and is persuasive, as amended claim 1 recites the limitation "A manufactured  $\beta$ -chitin complex...", a naturally occurring chitin-protein complex as disclosed by McCandliss et al. (US Patent 4,536,207, of record).

This rejection has been **withdrawn**.

The following are new or modified grounds of rejection necessitated by Applicant's Amendment, filed 27 May 2008, in which claim 1 is amended to change the

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scope and breadth of the claim. Claims 2-7 depend from claim 1 and incorporate all limitations therein, including changes in the scope and breadth of the claim

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Amended claims 1-5 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by McCandliss et al. (US Patent 4,536,207, issued 20 Aug 1985, cited in PTO-892) as evidenced by Falini et al. (Tissue Engineering, 2004, vol 10, p1-6, cited in PTO-892).

McCandliss et al. discloses a naturally occurring chitin-protein complex (column 1, lines 13-14). McCandliss et al. discloses the material is prepared from suitable chitin-containing material biomass raw material, for example mollusks (column 5, lines 38-43). As evidenced by Falini et al., chitin from mollusk shells is in the form of  $\beta$ -chitin, sandwiched between protein layers to form an inclusion complex (page 2, left column, lines 8-13). Falini et al. discloses the chitin-protein complex to exist as "intralamellar sheets", or sheets having a laminar structure meeting the definition of an intercalation compound (definition of "intercalation compound", IUPAC Gold Book, cited in PTO-892). McCandliss et al. discloses the complex dried at 100 °C, indicating it has a melting point of at least 100 °C, meeting limitations of instant claim 1. It is inherent that a protein is an organic compound, meeting limitations of instant claim 2, that contains at least

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oxygen and nitrogen, meeting limitations of instant claim 3, in the form of carboxyl and amino groups, and amide bonds, meeting limitations of instant claims 4 and 5.

McCandliss et al. discloses the protein functions as an antibiotic with nematostatic and nematocidal activity (column 4, lines 20-22), meeting limitations of instant claim 7.

Claims 1-5 and 7, reciting "A manufactured  $\beta$ -chitin complex..." define said  $\beta$ -chitin complex in terms of a product-by-process in that said complex is the product of a manufacturing process. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted) (Claim was directed to a novolac color developer. The process of making the developer was allowed. The difference between the inventive process and the prior art was the addition of metal oxide and carboxylic acid as separate ingredients instead of adding the more expensive pre-reacted metal carboxylate. The product-by-process claim was rejected because the end product, in both the prior art and the allowed process, ends up containing metal carboxylate. The fact that the metal carboxylate is not directly added, but is instead produced in-situ does not change the end product.). See MPEP 2113. It is apparent from what is disclosed that the natural product produced by biological processes disclosed by McCandliss et al. produces a

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product that is identical or substantially identical to the instant invention as defined in the claim.

**Response to Applicant's Remarks:**

Applicant's Remarks, filed 27 May 2008, have been fully considered and found not to be persuasive.

Applicant asserts that the inclusion complex or intercalation compound requires that the guest chemical species is inserted into spaces originally present in the structure of the host chemical species. However, the ordinary definitions of inclusion complex and intercalation compound (definitions of "inclusion complex" and "intercalation compound", IUPAC Gold Book, cited in PTO-892) do not require the space to be originally present in the structure of the host chemical species; one of skill in the art would reasonably interpret the phrase "A complex in which one component (the host) **forms** a cavity..." (emphasis added) to encompass the host chemical species actively forming a cavity around said guest chemical species due to the presence of said guest chemical species. Therefore, the macromolecular assembly of the structure evidenced by Falini et al. is compatible with the ordinary definition of an inclusion complex or intercalation compound.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drohan et al. (US Patent 6,124,273, issued 26 Sep 2000, cited in PTO-892) in view of Kim et al. (Journal of Polymer Science: Part B: Polymer Physics, 1996, 34, p2367-2374, cited in PTO-892).

Drohan et al. discloses a supplemented chitin hydrogel (column 6, lines 25-27) wherein the chitin serves as a carrier vehicle for "growth factors, analgesics, antimicrobial compositions, anti-inflammatory compounds, antibodies, anticoagulants, antiproliferatives, cytokines, cytotoxins, chemotherapeutic drugs, interferons, hormones, hydroxyapatite, lipids, oligonucleotides, osteoinducers, polymers, polysaccharides, proteoglycans, polypeptides, protease inhibitors, proteins (including plasma proteins), steroids, vasoconstrictors, vasodilators, vitamins, minerals, stabilizers and the like, for a prolonged period of time" (column 9, lines 35-45), meeting a limitation of instant claim 7. Drohan et al. discloses "supplemented" to mean the supplementary compound, or guest

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compound, may be mixed with the chitin components in liquid form prior to hydration or added to the hydrogel as the matrix sets up after hydration (column 12, lines 24-26) and a "matrix" to mean the structural properties or architecture of a solid or semi-solid (including a hydrogel) in which other components may be cast, mixed, dispersed or dissolved (column 12, lines 55-58). It is inherent that a polysaccharide is an organic compound, meeting a limitation of instant claim 2, that contains at least oxygen, meeting a limitation of instant claim 3, in the form of hydroxyl groups and ketal bonds, meeting a limitation of instant claim 4, and that it possesses a plurality of hydroxyl functional groups, meeting a limitation of instant claims 5 and 6. Drohan et al. does not describe the supplemented chitin hydrogel using the terminology of an inclusion compound, however a polysaccharide cast, mixed or dispersed in a chitin hydrogel matrix meets this description. Drohan et al. specifically disclose complexes of chitin and ciproflaxin (melting point 255 - 257 °C), tetracycline (melting point 170 - 173 °C) and ampicillin (melting point 208 °C) (column 31, lines 42-45, meeting a limitation of the melting point limitation of instant claim 1).

Drohan et al. does not specifically disclose the chitin to be  $\beta$ -chitin or the chitin complex comprising an intercalation compound (instant claim 1).

Kim et al. teaches  $\beta$ -chitin will be a good candidate material for uses in medical implant devices, wound dressings, drug delivery, and so on (page 2368, left column, lines 13-17). Kim et al. teaches permeation of water into the crystalline region of the  $\beta$ -chitin molecular was more easily allowed than that of  $\alpha$ -chitin (page 2370, right column, paragraph 2). Kim et al. teaches this swelling behavior of  $\beta$ -chitin suggests that it would



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be a good candidate for biomedical application using hydrogel types (page 2371, left column, paragraph 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the invention of Drohan et al. with the teaching of Kim et al. of the specific chitin  $\beta$ -chitin. Drohan et al. discloses chitin is a material that is biocompatible and naturally resorbed by the body, and has been previously used for sustained drug release, bone induction and hemostasis (column 1, lines 20-22). Drohan et al. discloses "Any chitin or its derivative, such as a commercially available chitosan, may be used in some embodiments of this invention. For these uses, such as localized drug delivery, the particular composition of the selected chitin or derivative is not critical as long as it functions as desired." (column 18, lines 56-60) Kim et al. teaches  $\beta$ -chitin will be a good candidate material for drug delivery, providing motivation for one of ordinary skill in the art at the time of the invention to combine the invention of Drohan et al. with the teaching of Kim et al. of  $\beta$ -chitin.

**Response to Applicant's Remarks:**

Applicant's Remarks, filed 27 May 2008, have been fully considered and found not to be persuasive.

Applicant remarks that the combination of Drohan et al. with the teaching of Kim et al. would not render obvious the intercalation compound of the instant invention as claimed. Applicant asserts that Kim et al. teaches that it is the context of facile chemical modification that makes Kim et al. suggest the use of  $\beta$ -chitin.

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Drohan et al. teaches the inclusion of said supplementary compound into the matrix of chitin (column 10, lines 40-45). Drohan et al. teaches the supplementary compound added to the hydrogel as the matrix sets up after hydration (column 12, lines 24-26).

Kim et al. teaches permeation of water into the crystalline region of the  $\beta$ -chitin molecular was more easily allowed than that of  $\alpha$ -chitin (page 2370, right column, paragraph 2) and that this swelling behavior of  $\beta$ -chitin suggests that it would be a good candidate for biomedical application using hydrogel types (page 2371, left column, paragraph 2).

$\beta$ -Chitin is distinguished from  $\alpha$ -chitin based on its crystalline structure, the parallel arrangement of  $\beta$ -chitin naturally forming sheets. Kim et al. teaches the permeation of water into the crystal structure of  $\beta$ -chitin, and teaches it is this swelling behavior that suggests that it would be a good candidate for biomedical application using hydrogel types. Drohan et al. teaches the formation of an inclusion complex of chitin and a supplementary compound and said supplementary compound added to the hydrogel as the matrix sets up after hydration, or during the swelling process when the water is permeating the crystal structure.

In view of the combined teachings of the prior art, it would have been obvious to one of ordinary skill in the art combine Drohan et al. with the teaching of Kim et al. to make an inclusion compound of  $\beta$ -chitin and a supplementary compound, said inclusion compound necessarily being an intercalation product because of the natural crystalline structure of  $\beta$ -chitin, with a reasonable expectation of success.

***Conclusion***

No claim is found to be allowable.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan S. Lau whose telephone number is 571-270-3531. The examiner can normally be reached on Monday - Thursday, 9 am - 4 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shaojia Anna Jiang can be reached on 571-272-0627. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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